CHIA Report on Bundled Payments, Volume 2

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Center for Health Information and Analysis

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Executive Summary

This is the second volume in a series of technical assistance reports produced by the Center for Health Information and Analysis (the Center), formerly the Massachusetts Division of Health Care Finance and Policy (the Division), to promote the adoption of bundled payment arrangements among providers and payers in the Commonwealth, as directed by Section 64 of Chapter 288 of the Acts of 2010.

This report estimates the potential savings that may have been achieved in the Commonwealth for model year 2009 by using bundled payment methods, as compared to traditional fee-for-service payments. Payment bundling was simulated for seven medical conditions using the publicly available Prometheus Payment Model and with enrollment and claims data from three private Massachusetts commercial payers, which represented approximately 65% of the state's commercially insured market.

The implementation of Prometheus bundled payments, with the assumptions of our analysis, would have resulted in a $26 million savings (12.8%) for the seven selected conditions. Total payments would have decreased from $201 million to an estimated $175 million. Savings would have been achieved primarily through a $17.4 million reduction in the cost of Potentially Avoidable Complications (PAC). Across each of the seven conditions, PACs were estimated to represent an average of 17% of total costs. Given the substantial proportion of the state's population left unaccounted for, this report may underestimate the total potential savings.

Estimated savings resulting from PAC reductions, however, varied considerably between conditions. For instance, while colonoscopy carried an estimated PAC savings of only 6.4%, coronary artery bypass graft (CABG) had an estimated PAC savings of 15.4%, leading to overall savings of 0.8% and 44.2%, respectively. These variations highlight the importance of further investigation into targeted use of bundled payments for high volume conditions with the greatest PAC and "typical care cost" savings potential.

In addition to savings, this simulation indicates that bundled payments have the potential to narrow provider price variation, improve transparency in health care payments, and contain cost escalation. The established base rate for "typical care costs" and PAC allowance included in the Prometheus bundled Evidence-Informed Case Rate (ECR), and derived from actual claims data, have the potential to be used as baseline prices for all providers treating a given condition within a payer's network or across all payers, creating a level of price standardization not currently found in the marketplace.

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1   Prometheus Payment Model Version 3.5.2

2   See Table 2 in Section 4 for more information.

1. Introduction

Section 64 of Chapter 288 of the Acts of 2010: *An Act To Promote Cost Containment, Transparency And Efficiency In The Provision Of Quality Health Insurance For Individuals And Small Businesses* directed the Division of Health Care Finance and Policy (the Division), now the Center for Health Information and Analysis (the Center), to undertake activities intended to foster the adoption of bundled payments among health care providers and payers in Massachusetts.

In response to Section 64, the Division published the Report on Bundled Payments, Volume 1, an initial report that introduced the concept of bundled payments and reviewed five bundled payment models. The purpose of this follow-up report is to help providers, payers and policymakers gain a better understanding of how bundled payment arrangements could work in practice and to illustrate the possible savings associated with the use of bundled payments, as compared to traditional fee-for-service payments. A bundled payment was defined as a method of reimbursing a provider, or group of providers, with a single fee or payment for the provision of multiple health care services associated with a defined episode of care. The defined episode and the services included, was developed based on clinical guidelines and in consultation with clinical experts. All five bundled payment models discussed in Bundled Payments, Volume 1 were designed to contain costs and improve quality for a defined episode of care by including financial incentives to increase the efficiency of service delivery and coordination of care.

The Prometheus Payment Model was described in the Division's *Bundled Payments, Volume 1*. It is used in this analysis to simulate a payment bundling scenario in the Commonwealth. Its use in this report does not serve as an endorsement of the Prometheus Payment Model; it is used only as an example of how bundled payment arrangements can operate, and to illustrate how savings may accrue when provider risk-sharing is incorporated into payment arrangements

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3   Episodes were designated to be either acute or chronic. Acute condition episodes were defined to occur over a defined period of time, with a clear beginning and end. Chronic condition episodes were defined to occur annually.

2. The Prometheus Payment Model

The publically available Prometheus Payment Model was designed and has been managed and implemented by the Health Care Incentives Improvement Institute, supported by grants from the Robert Wood Johnson Foundation and the Commonwealth Fund. The model was designed to improve quality, lower administrative burden, and pay providers based on best practices and clinical guidelines for treating patients. It bundles payments for all patient services related to a specific condition or procedure.[4]

To account for the potential, but unknown, costs of a specific episode, the Prometheus Payment Model defines and accounts for two types of risk:

(1) *Probability risk*, the fundamental form of insurance risk, which includes the likelihood of a patient complication as a result of his/her genes, health status, or any external event outside a provider's control; and

(2) *Technical risk,* the risk within a provider's control, including potentially avoidable complications (PACs) and other variations such as a provider's practice patterns. PACs indicate deficiencies in care that can cause harm to the patient and that could have been prevented with adequate treatment, coordination and/or training. The Prometheus Payment Model acknowledges that not all complications are avoidable.

By differentiating these two types of risk, accountability for the costs of care can be separated between payers and providers. In the Prometheus Payment Model, as applied in this report, payers continue to assume full financial responsibility for probability risk. Providers, however, assume some of the technical risk for the costs of PACs and readmissions, as technical risk is at least partially controllable by the provider.

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4 de Brantes, F., Camillus, J. (2007). Evidence-informed case rates: a new health care payment model. Washington, DC: The Commonwealth Fund.

Potentially Avoidable Complications (PACs)

A PAC is any event that negatively impacts a patient and that is potentially controllable by a provider.[5] For patients admitted to a hospital for acute conditions such as acute myocardial infarction (AMI), examples of PACs include cardiac arrest, urinary tract infections, and stroke. For patients having procedures such as bariatric surgery, examples of PACs include phlebitis (inflammation of a vein), acute post-hemorrhagic anemia, and fistula suture closure.

Under the Prometheus Payment Model, PACs for each condition are classified into one of three sources of complications: (1) index condition related PACs, (2) PACs due to co-morbid conditions, and (3) PACs related to patient safety failures. As providers are expected to work to avoid these complications, they are not fully reimbursed for all their associated costs in the Prometheus Payment Model. The purpose of holding providers accountable for PAC costs is to better align payment policies with quality improvement goals[6, 7] and to potentially reduce PAC occurrence over time.[8]

Calculating an Evidence-Informed Case Rate

Under the Prometheus Payment Model, payment is calculated using a patient-specific, evidence-informed case rate (ECR). An ECR consists of a base rate for costs of typical care, a severity adjustment, a provider margin, and a PAC allowance.[9]

ECR = base rate + severity adjustment + margin + PAC allowance

> (1) Base rate:
>
> The base rate is the cost of "typical care" for the ECR. It is determined by calculating costs for delivering care that is recommended by commonly accepted clinical guidelines for treating a given condition from beginning to end. It may be lower than the cost of commonly prescribed care.
>
> (2) Severity adjustment:
>
> An ECR may include a severity adjustment based on both patient and provider characteristics. This adjustment takes multiple factors into account, including patient demographics and co-morbidities, geographic location, and provider specialty. A severity adjustment is not applied in this analysis.

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5 Health Care Incentives Improvement Institute (2010). The history of the development of the Prometheus Payment Model defined potentially avoidable complications. Available at: http://www.hci3.org/sites/default/files/files/The%20History%20of%20the%20development%20of%20the%20Prometheus%20PACs%20Aug%202010%281%29.pdf (Accessed August 20, 2013).

6 For more detail regarding how provider quality performance can be scored and rewarded, please see the Bundled Payment Volume 1 Technical Appendix: http://www.mass.gov/chia/docs/r/pubs/11/bundled-payments-report-02-2011.pdf (Accessed August 20, 2013).

7 de Brantes, F., Rastogi, M., Painter, M. (2010). Reducing potentially avoidable complications in patients with chronic diseases: the Prometheus Payment approach. Health Services Research, 45(6p2), 1854-1871.

8 de Brantes, F., Rastogi, M., Painter, M. (2010).

9 de Brantes, F., Rosenthal, M., Painter, M. (2009). Building a bridge from fragmentation to accountability — the Prometheus payment model. New England Journal of Medicine, 361(11), 1033-1036.

(3) Margin:

An ECR also includes a provider profit margin, a pre-set markup factor that is applied to the severity-adjusted base rate. The margin acknowledges the importance of allowing providers a profit incentive, as well as the funds necessary to reinvest returns in business operations and capital assets. For this analysis, a profit margin of 10% is factored into the ECR, though this number, in practice, would be adjusted in negotiations between payers and providers.

(4) PAC allowance:

Like the profit margin, a PAC allowance for a given condition is established between a payer and a provider. If providers reduce or eliminate PAC costs beyond that the unused portion of the allowance is either kept by the provider or distributed as otherwise agreed. For this analysis, based on recent literature, 50% of the total PAC dollars were allocated to providers to fund the PAC allowance.[10] Therefore, the remaining 50% of the total PAC dollars were allocated as savings.

Covered Conditions

At the time this analysis was conducted, the Prometheus Payment Model included 21 ECRs for acute medical conditions and outpatient and inpatient procedures. These 21 ECRs had the potential to impact payments for nearly 30% of the entire insured U.S. adult population.[11] Due to data limitations, only seven of the 21 Prometheus Payment Model conditions were included in this simulation.

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10 Rastogi, A., Mohr, B.A., Williams, J.O., Soobader, M.J., & de Brantes, F. (2009). Prometheus payment model: application to hip and knee replacement surgery. *Clinical Orthopaedics and Related Research*, 467(10), 2587-2597.

11 Prometheus Payment Inc. (2009). What is Prometheus Payment? An Evidence-Informed Model for Payment Reform. Available at: http://www.rwjf.org/en/research-publications/find-rwjf-research/2009/06/what-is-prometheus-payment-.html (Accessed August 20, 2013).

3. Methods

This simulation calculated ECRs for patients receiving care in Massachusetts for two acute medical conditions and five procedural conditions (Table 1).[12] To calculate these ECRs, 2009 enrollment and claims data were used. These data were submitted to the Division by three private Massachusetts payers – Blue Cross Blue Shield of Massachusetts, Harvard Pilgrim Health Care and ConnectiCare – which represented an estimated 65% of the commercially insured market in the state.

- Acute medical conditions:

  ECRs for acute myocardial infarction (AMI) and pneumonia are included in this report. The acute medical ECRs cover the index hospitalization and a thirty-day period after discharge from the index stay.

- Procedural conditions:

  Five procedural conditions are included in this report: coronary artery bypass graft (CABG), bariatric surgery, cholecystectomy (gallbladder surgery), pregnancy and delivery, and colonoscopy.

Because this analysis was performed at the aggregate level, severity adjustments were not used in the calculations. For more discussion on the implications of this exclusion, among others, see Section 5, Data Limitations and Assumptions.[13]

Table 1: Overview of ECRs in this Simulation

ECR Category	ECR Description	ECR Time Window	
		Look-Back Period	Look-Forward Period
Acute Medical ECR	AMI	0 days	30 days post-discharge after index stay
	Pneumonia		
Procedural ECR	CABG	30 days prior to index admit date	180 days post-discharge after index day
	Bariatric Surgery		
	Gallbladder Surgery	60 days prior index procedure	180 days post-discharge after index procedure
	Pregnancy and Delivery	First definitive diagnosis of pregnancy; or 9 months (36 weeks) prior to admit date for delivery	2 months (8 weeks) after discharge from delivery
	Colonoscopy	7 days	30 days post-discharge after index procedure

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12 Health Care Incentives Improvement Institute (2010). http://www.prometheuspayment.org (Accessed August 20, 2013).
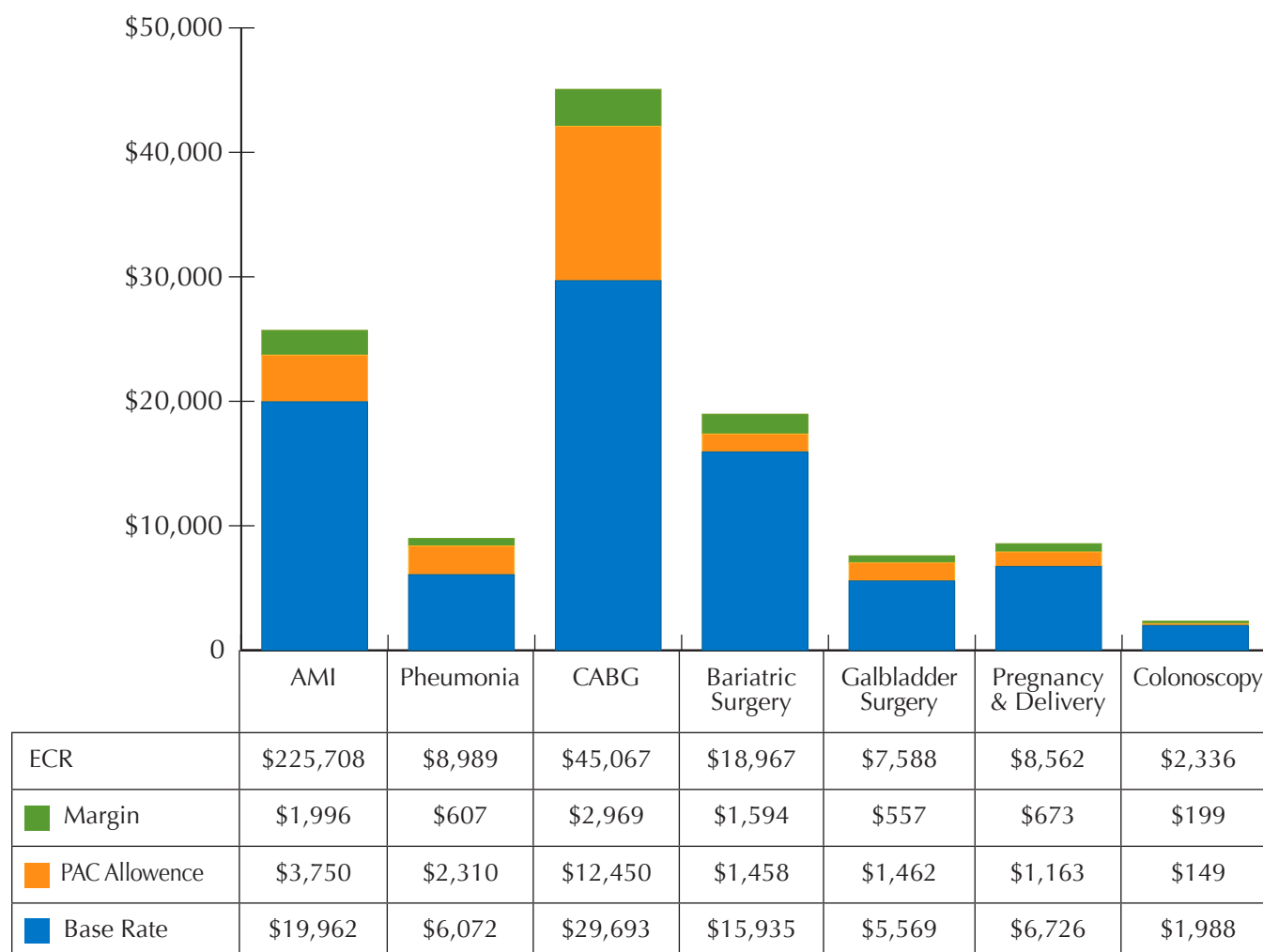
13 See the Technical Appendix for definitions of episodes of care and further information on the simulation methodology.
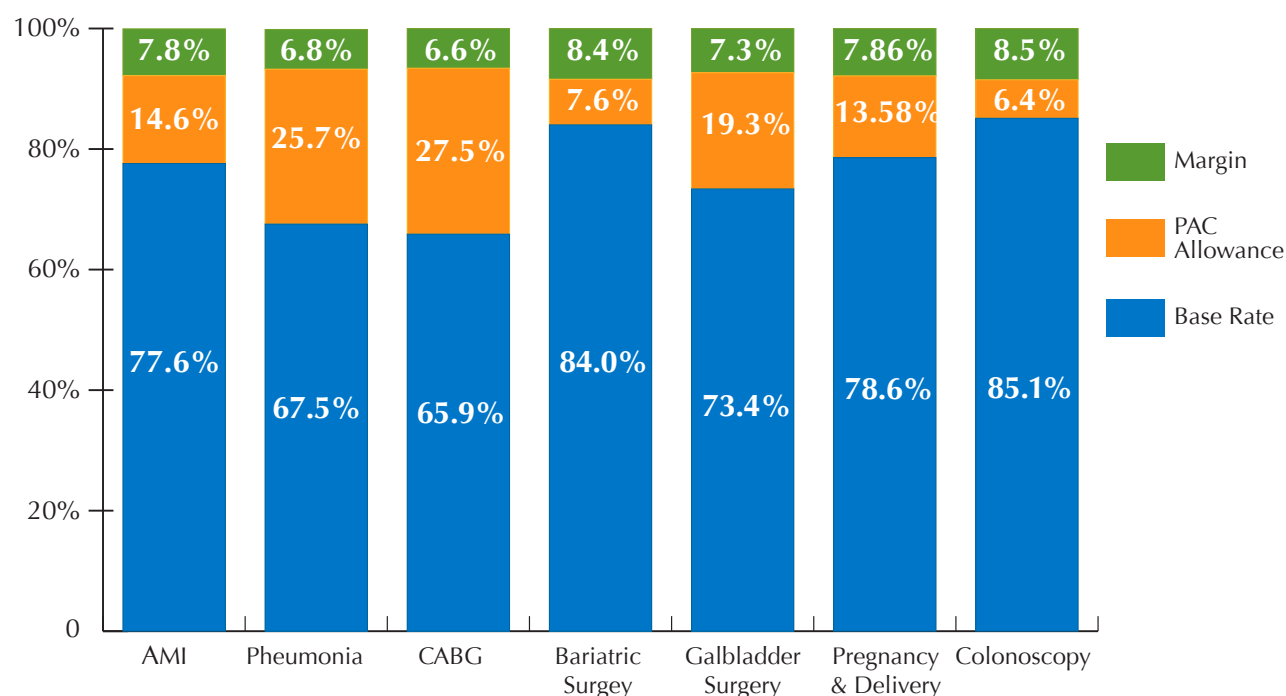
4. Results

Evidence-Informed Case Rates

The modeled ECR costs for the seven selected conditions ranged from $2,336 for a colonoscopy to $45,067 for a CABG. The base rate for "typical care" represented the majority of dollars spent within each ECR for each of the seven conditions (Figure 1).

Figure 1: ECRs for the Selected Conditions

	AMI	Pheumonia	CABG	Bariatric Surgery	Galbladder Surgery	Pregnancy & Delivery	Colonoscopy
ECR	$225,708	$8,989	$45,067	$18,967	$7,588	$8,562	$2,336
█ Margin	$1,996	$607	$2,969	$1,594	$557	$673	$199
█ PAC Allowence	$3,750	$2,310	$12,450	$1,458	$1,462	$1,163	$149
█ Base Rate	$19,962	$6,072	$29,693	$15,935	$5,569	$6,726	$1,988

The level and share of the PAC allowances varied considerably by condition. PAC allowances ranged from 6.4% of the colonoscopy ECR to 27.5% of the CABG ECR (Figure 2).

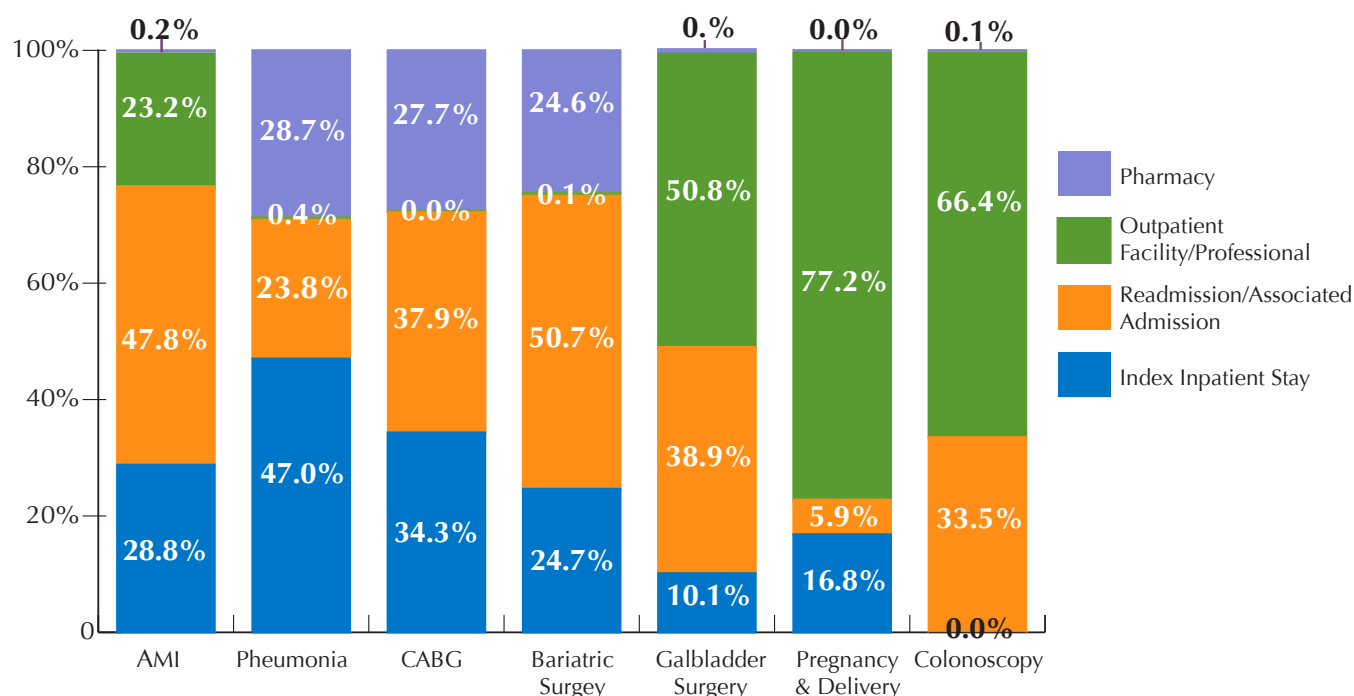**Figure 2: Distribution of ECR Components**

Distribution of PAC Costs

PAC costs originated from different service categories, including Index Inpatient Stays, Outpatient Facility/ Professional services, Readmissions and Associated Admissions, and Pharmacy costs, and varied across conditions (Figure 3).

Readmissions and Associated Admissions accounted for the largest proportion of PAC costs for three of the seven conditions examined: AMI (47.8%), CABG (37.9%), and bariatric surgery (50.7%). Outpatient Facility/ Professional services represented the largest proportion of PAC costs for gallbladder surgery (50.8%), pregnancy and delivery (77.2%), and colonoscopy (66.4%).

This may be explained by standard protocols for procedural conditions more often recommending care that is delivered in outpatient and ambulatory settings, adding to the likelihood that potentially avoidable complications in the treatment of these conditions will occur in these settings.[14] Index Inpatient Stay made up the greatest PAC costs for pneumonia. Pharmacy PAC costs made up substantial proportions of PAC costs for pneumonia (28.7%), CABG (27.7%), and bariatric surgery (24.6%).

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14 Heber, D., Greenway, F., Kaplan, L., Livingston, E., Salvador, J., Still, C. (2010). Endocrine and Nutritional Management of Post-Bariatric Surgery Patient. *Journal of Clinical Endocrinology and Metabolism, 95*(11), 4823-4843.

Figure 3: Composition of PAC Costs by Service Type

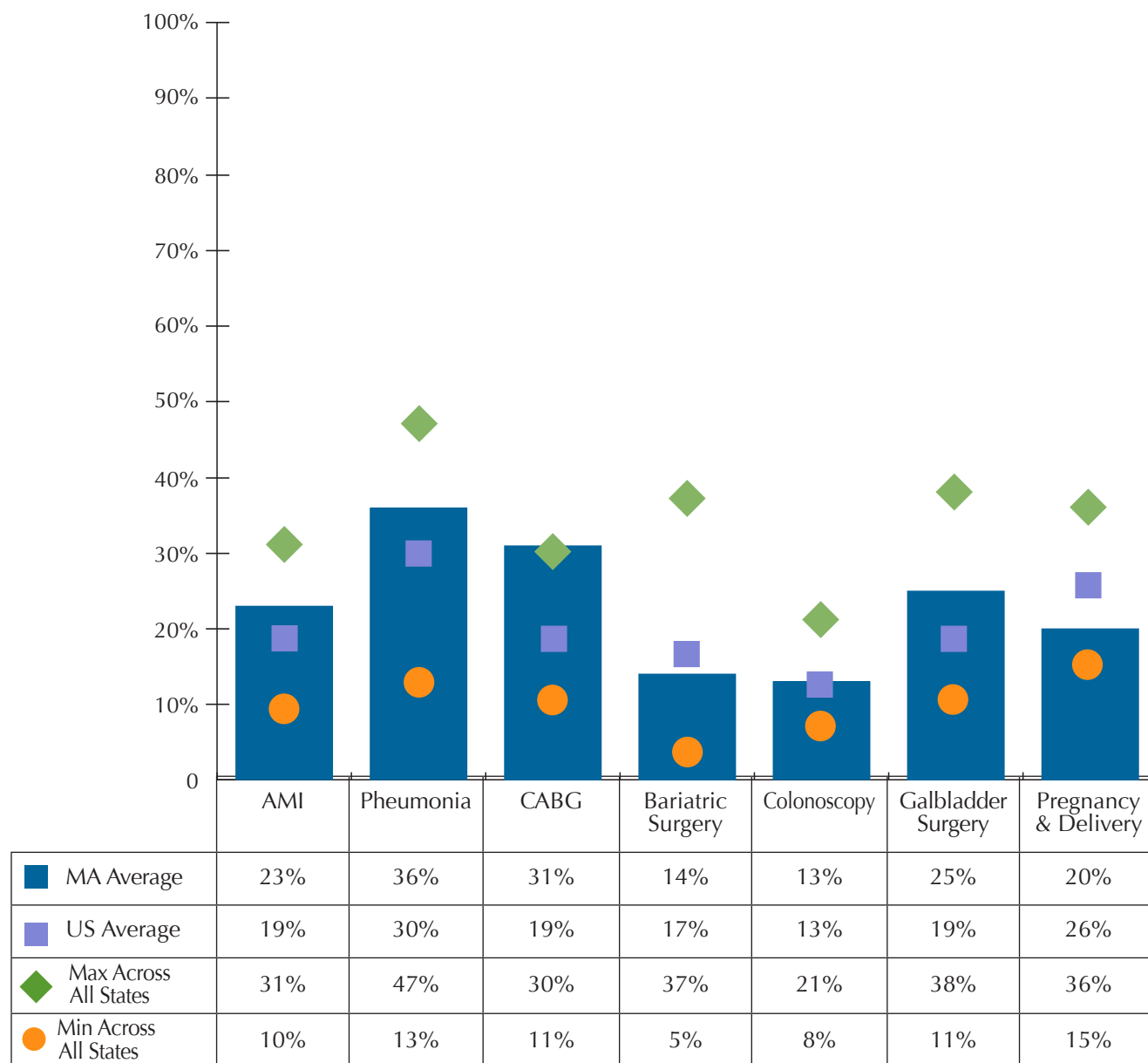**Massachusetts PAC Cost Compared to Other States[15]**

The proportion of total cost attributable to PACs in Massachusetts was higher than the national average for four of the seven conditions studied (AMI, pneumonia, CABG, and gallbladder surgery) (Figure 4). Massachusetts was below the national average PAC cost-proportion for bariatric surgery, colonoscopy, and pregnancy and delivery.

Among the seven selected conditions, pneumonia had the highest proportion of total costs attributable to PACs in both Massachusetts (36%) and the nation (30%).

While comparability to national averages may be limited due to the exclusion of severity adjustments, these findings are consistent with other studies of regional cost variation.[16] Variation in the incidence and expense of PACs among providers and across geographies suggests that there are inefficiencies in the treatment of certain conditions, and opportunities to improve the quality of care that patients receive.

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15 Massachusetts; as represented by an estimated 65% of the market.

16 Dartmouth Institute for Health Policy and Clinical Practice. *Dartmouth Atlas of Health Care.* Hanover, NH: Dartmouth Institute. Available from: http://www.dartmouthatlas.org/ (Accessed August 20, 2013).

Figure 4: PAC Costs as a Percentage of Total Costs

	AMI	Pheumonia	CABG	Bariatric Surgery	Colonoscopy	Galbladder Surgery	Pregnancy & Delivery
■ MA Average	23%	36%	31%	14%	13%	25%	20%
■ US Average	19%	30%	19%	17%	13%	19%	26%
◆ Max Across All States	31%	47%	30%	37%	21%	38%	36%
● Min Across All States	10%	13%	11%	5%	8%	11%	15%

Source: 2009 data from three Massachusetts private payers; 2008-2009 data for private payers in all states provided by Health Care Incentive Improvement Institute.

Note: The proportion of total CABG costs attributable to PACs in Massachusetts is greater than the national maximum because Massachusetts 2009 data is from three payers, whereas 2008-2009 data from all private payers in all states was used to calculate the national maximum. Additionally, there may be differences between Massachusetts and the U.S. in patient severity that are not accounted for in this analysis.

Potential Savings from Bundled Payments

For the three payers in this simulation, the total cost for the seven conditions in 2009 was $201 million. Applying a Prometheus Payment Model ECR with the PAC allowance, typical costs, and margin assumptions for each of the conditions would have resulted in an estimated cost of $175 million, a cost savings of $26 million or 12.8%.

Most of these savings would have resulted from the reduction of PAC payments. Those conditions with high PACs, as a percentage of total actual costs, and a high number of episodes, resulted in the greatest cost savings (Table 2). Pregnancy and delivery, for instance, with PAC costs at 19.5% of total actual costs, and the second highest number of episodes of the conditions reviewed, would have resulted in the greatest total estimated savings at $9.4 million. With a fewer number of episodes but a higher percentage of PAC costs, AMI followed with an estimated $4.8 million total cost savings.

As previously discussed, total estimated savings are not solely tied to PAC costs. Negotiated margins and savings derived from following clinically-prescribed "typical cost" procedures can also counter and support cost savings, respectively. This is seen most clearly within this analysis' colonoscopy example.[17] While an estimated 50% PAC reduction would have resulted in a 6.4% savings on the procedure, the assumed constant margin of 10% reduced the procedure's overall savings to 0.85%. Such examples further emphasize the need to be aware of and to account for these dynamic factors when targeting bundled payment use.

While colonoscopy had the lowest total estimated savings at 0.85% ($0.9 million), the remaining conditions and procedures all saw greater savings, ranging from 10.3% (bariatric surgery, $1.1 million) to 44.2% (CABG, $4 million), as compared to payment for the conditions in 2009 using fee-for-service.

Excluding colonoscopy,[18] total estimated savings for the remaining six conditions was $25 million or 26.7% of actual costs in 2009.

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17 This example is simplified for explanatory value. Prometheus-estimated "typical care costs" also resulted in estimated savings.

18 Because of the high volume of colonoscopy episodes included in this bundled payment analysis, the proportion of savings per episode is further diluted

Table 2: Potential Savings from Bundled Payments for the Selected Conditions[19]

ECR Description	# of Episodes	Total Cost (million)	PAC as % of Total Cost	Total ECR Cost (million)	Total Saving (million)	Savings %
AMI	720	$23.3	23.2	$18.5	$4.8	20.6
Pneumonia	569	$7.3	35.9	$5.1	$2.2	30.2
CABG	111	$9.0	30.7	$5.0	$4.0	44.2
Bariatric Surgery	491	$10.4	13.6	$9.3	$1.1	10.3
Gallbladder Surgery	797	$9.4	24.9	$6.0	$3.3	35.4
Pregnancy and Delivery	2,815	$33.5	19.5	$24.1	$9.4	28.1
Colonoscopy	45,921	$108.1	12.7	$107.3	$0.9	0.85
Total	51,424	$201.0	17.3	$175.4	$25.7	12.8
Total without colonoscopy	5,503	$92.9	22.7	$68.1	$24.8	26.7

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19 Totals may not sum due to rounding

5. Data Limitations and Assumptions

Data Limitations

The data in this analysis is based on expenses for three Massachusetts payers, which collectively accounted for 65% of the Commonwealth's private, commercially insured market. This analysis used eligibility records for members covered for any time from January through December 2009. These records were submitted to the Division by payers in 2009. Similarly, this simulation used medical and pharmacy claims for services rendered in 2009. It is not known, however, whether these rendered services were concentrated among providers with higher or lower costs, higher or lower volumes, or higher or lower average levels of patient severity. This uncertainty has potential implications on cost savings estimates.

If the available data originates from providers with disproportionately higher costs and greater levels of PACs, the potential bundled payment cost savings averages for the seven conditions may be lower than the estimates in this report.[20] Cttonversely, if the providers sampled through these three payers had a lower than average severity mix or accounted for a smaller proportion of the state's overall volume in these conditions, the opposite could be true.

Coverage data was also limited to Massachusetts residents who have both medical and prescription drug coverage through an employer or through the private, non-group market. Members in Medicare Advantage or Medicaid managed care were excluded from this analysis, likely resulting in an underestimate of the potential total cost savings.

This simulation analyzed only seven of the 21 medical conditions and procedures for which there is an ECR in the Prometheus Payment Model. As the simulation timeframe spanned only one calendar year, the analysis was limited to conditions and services in which the ECR time window could be contained in the one-year period. Chronic conditions that require a one-year period after the trigger claim, for instance, were excluded. Additionally, the data in this analysis do not fully account for a look-forward period of a patient having gallbladder surgery in December (180 day look-forward period), so those ECR observations were dropped from the simulation.

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20 Cost savings totals are likely underestimates, given that only 65% of the commercial market is accounted for in this analysis.

Data Assumptions

This simulation is based on a number of assumptions that may limit the generalizability of its results. As discussed in Section 1, a key assumption made in this analysis is that cost savings will be achieved by eliminating a specified proportion of estimated PAC costs for a given condition. This study estimated PAC savings at 50%[21] (a PAC allowance of 50%) based upon widely cited literature. However, other studies have used different PAC allowance metrics.[22] Establishing the level of PAC savings within any simulation directly impacts the amount of overall ECR bundled payment savings.

The Prometheus Payment Model also assumes a margin of 10% of a condition's "typical care price" for providers for all seven conditions. This margin level likely differs in each provider-payer relationship and may also vary from condition to condition, neither of which is accounted for in this simulation.

21 Rastogi, A., Mohr, B.A., Williams, J.O., Soobader, M.J., & de Brantes, F. (2009). Prometheus payment model: application to hip and knee replacement surgery. *Clinical Orthopaedics and Related Research*, 467(10), 2587-2597.

22 Brantes, F., Rastogi A., Painter, M. (2010). Reducing Potentially Avoidable Complications in Patients with Chronic Diseases: The Prometheus Payment Approach. *Health Services Research*, 45(60, 1854-1871.

6. Discussion and Conclusions

To address policymakers' concerns about rising health care costs, fragmentation, and inefficiency in care delivery, Section 64 of Chapter 288 of the Acts of 2010 directed the Division to foster the adoption of bundled payment arrangements in the Commonwealth. Bundled payment models show promise in reducing health care cost growth by implementing financial incentives that better align health care service provision and health care costs. Bundled payments are also one of the alternative payment methods proposed in the Patient Protection and Affordable Care Act and have been part of demonstration projects initiated by the Centers for Medicare and Medicaid Services.

Condition-specific Savings Varies with PAC Prevalence, Margins, and Volume of Episodes

This report quantifies the potential cost savings in treating seven medical conditions using a Prometheus Payment Model. In 2009, it estimates that the Commonwealth may have saved $26 million, or 12.8% of payments for these conditions using this model.

The results also show a wide variation in the proportion of total costs attributable to PACs among the selected seven acute and procedural conditions, ranging from 13% for colonoscopy to 36% for pneumonia. Because savings under bundled payments are largely - though not exclusively - derived from non-payment for and reduced incidence of PACs, potential savings also vary by condition, from 0.85% for colonoscopy to 44% for CABG.

Margins and "typical care costs," two other components of ECR payments, should also be considered when determining a condition's potential costs. As shown in this analysis for colonoscopy, these factors can significantly impact the overall savings potential of a condition.

This finding suggests that targeting the use of bundled payments methods to conditions with higher proportions of PACs, lower margins, and a greater number of episodes of care may generate a higher return in both quality of care (lower incidence of PACs) and potential cost savings for the Massachusetts health care system.[23]

Providers as Risk-Bearers

Cost savings are primarily achieved in the Prometheus Payment Model when a share of the identified PAC costs is no longer reimbursed by payers. The share that continues to be reimbursed, the PAC allowance, is a rate negotiated between payer and provider. This proportion will remain a component of an ECR budget for providers, regardless of whether or not PACs occur. Providers that incur lower PAC costs keep the full budgeted amount. Providers that incur PAC costs greater than the budgeted PAC allowance must absorb the deficit.

For example, among the conditions analyzed in this report, the PAC allowance for CABG was $12,405 per ECR. If a provider treats a CABG episode without incurring any PAC costs, the provider can retain the entire budgeted $12,405 PAC allowance. Conversely, if a provider incurs $20,000 in PAC costs during the course of a CABG episode, it will be reimbursed only $12,405 and pay the difference.

This creates an incentive for providers to reduce unnecessary costs through coordinated, comprehensive, episode-focused care, which could result in system cost savings and impact future consumer premiums.

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23 de Brantes, F., Rastogi, A., Painter, M. (2010). Reducing potentially avoidable complications in patients with chronic diseases: the Prometheus Payment approach. *Health Services Research*, 45(6p2), 1854-1871.

ECR Potential to Reduce Price Variation

ECRs that are derived from actual claims data can provide a foundation for price transparency. Once an ECR is established, the amounts budgeted for typical care and PAC allowances have the potential to be fixed for all providers within a payer's network. These set values can then provide a price baseline for the treatment of certain episodes of care for other payers. Greater price transparency and more standardized baseline prices may lead to a reduction in health care price variation.

Additional Savings Possible with Consideration of Additional Conditions and Payers

Total potential savings to the Massachusetts health care system may be greater than that amount expressed in this report. This report focuses exclusively on seven conditions and the costs attributed to three payers. Potential savings may be greater if payment bundling is expanded to more conditions. System cost savings would also likely be more substantial if all payers were to adopt a bundled payment methodology for suitable conditions.

Opportunities for Further Research

This report does not address how provider behavior may change in response to bundled payments or any other alternative payment method. Further research is needed to examine whether and how bundled payments can align incentives for providers to collaborate across settings, enhance care coordination, and improve efficiency and quality of care.

Acknowledgements

Technical Appendix

Estimation of Prometheus ECR rates was performed using health plan data on member eligibility, medical claims, and pharmacy claims submitted to the Massachusetts Health Care Quality and Cost Council and the Division of Health Care Finance and Policy. Data from three private carriers, representing approximately 65% of the commercially insured market, were analyzed.[23] The analysis was limited to Massachusetts residents who have both medical and prescription drug coverage through an employer or through the private, non-group market. Members in Medicare Advantage or Medicaid managed care were excluded from this analysis.

The analysis incorporated eligibility records for members covered for any time during January through December 2009, as well as any medical claims or pharmacy claims incurred during that period. Eligibility data used in the analysis came entirely from files submitted by health plans in 2009, while medical claims and pharmacy claims files submitted in 2009 and continuing through mid-2010 for services rendered in 2009. In order to ensure that spending estimates would be accurate and readily interpreted, members with any capitated claims during that period were excluded. An encrypted unique member identifier was used to link eligibility and claims records. In cases where multiple versions of a given claim were present in the dataset, only the final version was retained. After these data cleaning and sample limitation steps were taken, the dataset contained 2,099,660 members.

Because the timeframe of the data spanned only one calendar year, this analysis was limited to conditions in which the ECR time window was contained within the one-year period. Chronic conditions that required a one-year period after the trigger claim were excluded.

A trigger admission is the index claim that starts a new ECR. The trigger is identified through ICD-9 diagnosis codes either alone or in combination with ICD-9 procedure codes or HCPCS/CPT codes listed in the Prometheus Payment Model ECR Manual. For AMI, pneumonia, CABG, and bariatric surgery, all related inpatient admissions during the ECR time window, other than the index trigger admission, are defined as readmissions.[24] For gallbladder surgery, pregnancy and delivery, and colonoscopy, all related inpatient and outpatient admissions that occur before or after the index trigger admission are defined as associated admissions.[25]

Proprietary Prometheus software was used to run this analysis with fields and analytic files coded to specifications provided by the software's manual. The software required inpatient claims information to be aggregated to the visit level, and that inpatient data be stored in a separate analysis file from all other medical claims (which remained at the claim line level). Inpatient medical claims were defined as those for which at least one line had either a room and board code in the revenue code field (codes 100-189 and 200-229) or a Type of Bill code of 11.[26]

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[23] Carriers whose data were retained in analysis were Blue Cross Blue Shield of Massachusetts, Harvard Pilgrim Health Care, and ConnectiCare.

[24] For more information about the logic and algorithm of Prometheus Payment Model, please see the ECR Manual Version 3.5.2. Available at: http://www.prometheuspayment.org/sites/default/files/files/Prometheus%20ECR%20Manual%20V3_5_2.pdf (Accessed August 20, 2013).

[25] Masspro, Inc (2010). ECR Manual Version 3.5.2. Health Care Incentives Improvement Institute, Inc.

[26] The Prometheus manual directs users to define inpatient claims as those with a Type of Bill code of 11. The revenue codes listed here were added to this definition in consultation with staff at the Health Care Incentives Improvement Institute, so that this analysis would not be biased by a large number of claims that were missing the Type of Bill code.

Several steps were needed to aggregate the claim line level data into one record per inpatient visit. Unique inpatient visits were defined based on member, hospital, and dates of service. The allowed amount for each visit was calculated as the sum of the allowed amounts from the individual claim lines. For visits that had multiple procedure codes, modifiers, revenue codes, or diagnosis codes, these codes were de-duplicated and placed into separate columns in the aggregated dataset. For a small proportion of visits that had more than one discharge status code, the code appearing on the claim line with the highest allowed amount was retained. Admission source and place of service were coded by retaining the codes for emergency room service on the aggregated record for the visit if any of the associated claim lines indicated emergency room service.[27] This method was chosen because the Prometheus software uses these fields only to identify claims that involved an emergency room service.

A separate file was created for non-inpatient medical claims. Individual files were also created for pharmacy claims, member information, and dates of member enrollment spells. The data preparation for these files was less complex than for the inpatient file, involving a small amount of recoding, formatting, and general data cleaning steps such as those described above (e.g., eliminating members who had a capitated claim at any point).

After creation of analysis files, the Prometheus proprietary software was used to perform all aspects of the data analysis, including identification of episodes and associated claims, assignment of claims to either the typical care category or the PAC category, and calculation of total spending by condition and service type. The analysis program produced output containing spending by condition and service type, and these numbers were used to calculate the ECRs included in this report.

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27 Because some claims in the raw data were missing the place of service code, this field was imputed for those records by coding the place of service as emergency room if the CPT procedure code (99281-99285) or revenue code (451-459, 981) indicated emergency room service. The same imputation was used for the non-inpatient claims. As with the modification to the inpatient definition above, this imputation logic was developed in consultation with staff at the Health Care Incentives Improvement Institute.

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